

Table 12
Transduction assay

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Used Traced typical substitution

Significance

lg	Re	Recp. cells	typical	substitution	idiotypic	celotypic	polytypic	total
S	1	+	+		9	0	9	9
+	1	+	+		33	0	33	33
S	2	+	+		16	0	16	16
+	2	+	+	x (1) ²¹⁷⁵ 1210 ^{with} cut	20	0	20	20
		+	+	x (2) ¹²¹⁰ 2175 ^{cut}	15	0	15	15
S	4	+	+		46	0	46	46
+	4	+	+		20	0	20	20

S	1	x 3 (1) 1210 (typical)	6	0	6	7
S	1	x 4 (2) 902 (typical)	1	0	1	
+	1	x 5 (3) 1210 (typical)	36	6	42	
		x 6 (4) 1210 (typical)	18	3	21	

S	2	1	20	0	20
		4	21	1	23

(1), (8), (10) = cut 2175
(2), (7), (9) = cut 1210
+ 7
(3), (6), (11) = type 1210
(4), (5), (12), (13), (14) = type 902

		x 7 (5) 1210 (cut)	19	2	21
		x 8 (6) 2175 (cut)	14	3	19
+	2	4 x 9 (7) 1210 (cut)	22	1	23
W		x 10 (8) 2175 (cut)	9	7	16

S	4	x 11 (9) 1210 (typical)	17	2	19
		x 12 (10) 902 (typical)	35	5	41

+	4	2 x (13) (902) (typical)	16	3	19
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R	4	2 x (14) (902) (typical)	15	3	18		
<u>450</u>							

P. 72
282

I The transductants

Gal₁⁻ Lys⁺ cells exposed to HFT
gal₁⁻

~~gal₁⁻~~
(+) colonies

(-) colonies

Colonies
picked after
28 days

lysate checked
control

0
0

408
440

2
0

II The populating colonies

gave mixed (+), (-) and populating colonies
A) streaked out 24 pure (+) colonies picked and streaked out

B) of the 24 colonies - 6 were found stable gal⁺

C) of the 18 apparently (-) colonies (picked at 24 hours) derived from pure (+) tested against HFT 1⁻ and HFT 4⁻

Gal ₁ ⁻	Gal ₂ ⁻	Gal ₁ ⁻ Gal ₂ ⁻	Partially (-) populating	Doubtful results
6	5	2	4	+

all colonies lambda resistant

leave
out

285 I the transductants

Gal₁⁻ Lys⁺ cells treated with HFT gal₁⁻
(+) (-) pop. colonies partially lysed

A) Control plating	0	465	0	0
B) lysate plating	0	316	2	38

II A) the populating colonies streaked out - Each gave (+), (-), pop (+)

B) Colony 1 - 24 gal⁺ col streaked out - 11 were stable gal⁺

(-) tested against HFT 1⁻ and HFT 4⁻ One lambda prot.

Gal ₁ ⁻	Gal ₂ ⁻	Gal ₁ ⁻ Gal ₂ ⁻	Partially (-) populating
10	2	0	1

C) Colony 2 - 48 gal⁺ picked and streaked out - 23 (?) were stable (+)

(-) tested against HFT 1⁻ and HFT 4⁻

Gal ₁ ⁻	Gal ₂ ⁻	Gal ₁ ⁻ Gal ₂ ⁻	Populating (-)
4 *	0	0	22

Table 16

Half and - are retained for closer study.

The gal, - gal, interaction

About 650 cultures have been tested in this way, each from a separate

1 The heavy dishes

Reagent Cells	Toned hyale	Number of Colonies		
		Gal (+)	Gal (-)	Papillatory Gal -
Gal -	birth HEE	0	440	0
	HFT Gal -	0	408	2
Gal -	birth	0	465	0
	HFT Gal -	0	316	2

Public Health Laboratory, to Dr. C. R. Miller and Dr. J. B. Bennett, and especially to R. St. Benham and his staff of the University of Chicago for supplying the larger part of these cultures. About 25 of them have shown signs of recombination with W-1; at least 20 of them almost certainly. Polyauxotroph mutants are now available only for W-1 though -A, and have

2 Mutations of galactose-negative segregants from galactose positive clones found in papillatory galactose negative colonies

Reagent Cells	Toned hyale	Classification of segregants				Papillatory Gal -
		Gal -	Gal -	Gal -	Gal -	
Gal -	HFT Gal -	6	5	2	0	4
Gal -	HFT Gal -	10	0	0	0	1

and of course, and particularly in patterns of sensitivity to phages, including

and to antibiotics produced by various other cold strains, colonies. W-5

produce a cold active on most of the others. It is clear that many

potentially compatible combinations may still exist in the population of W-1

by a colicin produced by the other parent.

<u>Page</u>	<u>Lyate</u>	<u>Assay cells</u>	<u>Needs</u>	<u>1 die Lyate</u>
<u>176 b</u>	04E750	811, 2050, 750, 2175,	(42/43) (420/16+)	(1/2) (1/14) —
			repeated	

89

<u>177</u>	8921	578	4% of cell (+)	—
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<u>177b</u>	lyate sterility			—
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<u>211</u>	2175E750	811,	solid swan	—
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Summ. sheet 214 before - page 578+142^u not active

W2070 (= gal₆ - ?) derived from W1673 by uv.
LPS

Page

135a - inj. (three gal - obtained, one retained) (#1)

136 - found by (+) no add = 7
1412(25) = 1560

137 - pop. check - 7/5 pentamer (+) stabl.
7/1 by rate (1412) (+) unstabl.

145 - trsd. test
no add 10
700λ 54 * — 4/6 (+) unstabl
902λ 1256 — 5/6 (+) unstabl
84λ 175 — 0/6 (+) unstabl.

295 - trsd. by T18, T19λ to recover (-) of the T.

lyses not active T16: 5/1

→ Apparent (+) unstabl segments below found.

T19 = 7/2
Apparently, segments found
of 16 segments 15 2-
1 1-2-
16

5 1-
2 2-
7

226 Stocks of 2070λ + made

Stability of transducers by revision by sales

(24)

Age

Observation

134	STAT 8U ₅ + #5	7/8 stable	$\frac{\text{transducer}}{\text{control}} = \frac{3532}{30}$
135a	8U ₅ + #5	8/8 stable	$\frac{\text{transducer}}{\text{control}} = \frac{291}{25}$

Circulation of Lip Charge & Transduction

236A 2281 + K12

236D 2281 + 750

Pap	LP ^{AK} 2281	Seq	λ	Pap	LP ^{AK} 1485	Seq	λ
1.	+	2-	R	19	+	2-	R
2.	+	"	R	1	S or R	2-	S
3.	+	"	R	2			
4.	+	"	R				
5.	+	"	R				
6.	+	"	R				
7.	+	"	R				
8.	+	"	R				
9.	+	"	R				
10.	+	"	R				
11.	+	"	R				
12.	R or S	"	S				

the action of these factors
as transductions described thus far have been effected by

means of lysates prepared by the ultraviolet inactivation technique. Lysates
produced by growth of the phage on a sensitive culture apparently
have no transducing activity and have lost the transducing activity

included in the inoculum (table 8). It has also not been possible to
select transductions by these means of a mixture of phages examined
in connection with the action of these factors it should be noted

that culture filtrates of phages sensitive cultures have no transducing
activity.

the transduced cells
characteristic of the other characteristics of the cells transduced
are it is found that phages have uniformly shown no changes in any
of them with the exception of the reduction of transducing activity in the filtrate
which is known to occur in some cases. In general, therefore, of some of
the the phages transducing phages is their transducing activity affected
transduction, and especially for the transduction.

HFT - histriol - Why + " not found HFT ?

(4A)

Page	lyrate	Array Cells	Reaction	lyrate liter	
125	750E1821	811	2470 pap/hc	6.5 x 10 ⁹	
date 10/9/52	"	578	9630 ⁺ /ml	"	$\frac{10^4 \text{ /ml}}{10^{10} \text{ /ml}} = \frac{1}{10^6} \lambda$
142	578E892-1	518	no pop. less than control	?	<p>lyrate found not sterile</p> <p>lyrate found sterile</p>
11/26/52	811E892	"	no pop. at all	?	
	518E892-1	2050	solid mass	?	
	811E892-1	"	" "	?	
143	518E892-1	2050	solid mass	?	<p>$= 1.8 \times 10^9 \text{ /ml}$</p> <p>all lyrate bottles sterile in presence (10 ml) control. 202 202 (very high) small papillae - spreader culture?</p>
	518E892-2	"	solid "	?	
	811E892-1	"	solid "	?	
	811E892-2	"	188 pop.	?	
157	518E892 → (-) 24, 802-	2050	solid mass	?	
	518E892-1	"	" "	?	
	1436E1412-1	"	227/22	?	

161 included by contamination

165, a, b	518E892-1 (quad aliquots)	750, 2050, 2175	solid mass	1.8 x 10 ⁹ (p 166)
	01 (518E892 → 802, 802)	518, 750, 2050 (not 2175)	" "	not found.

168	D1E750 D4E750	stated as unstable	-	-
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169	D4E750	liter > 10 ¹⁰	-	-
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170 b	D4E750 (1-10)	80518	24/67	↑
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HFT
NFT Summary U^+

	<u>Recipient cells</u>	<u>lytate source</u>	<u>Test</u>		
			<u>1⁻</u>	<u>2⁻</u>	<u>4⁻</u>
	gal_2^- (12125)	gal_1^- (11)			
①	gal_1^- ①	+	++	++	+++
②	" ②	+	+++	++	+++
③	gal_2^- (hp ^d)	+	+++	100	+++
④	gal_1^-	gal_2^-	+++	+	—
<u>others</u>					
⑤	gal_2^- ①	gal_2^-	++	200	+++
	②	—	—	—	2
⑥	gal_2^-	gal_1^-	+++	+++	+++

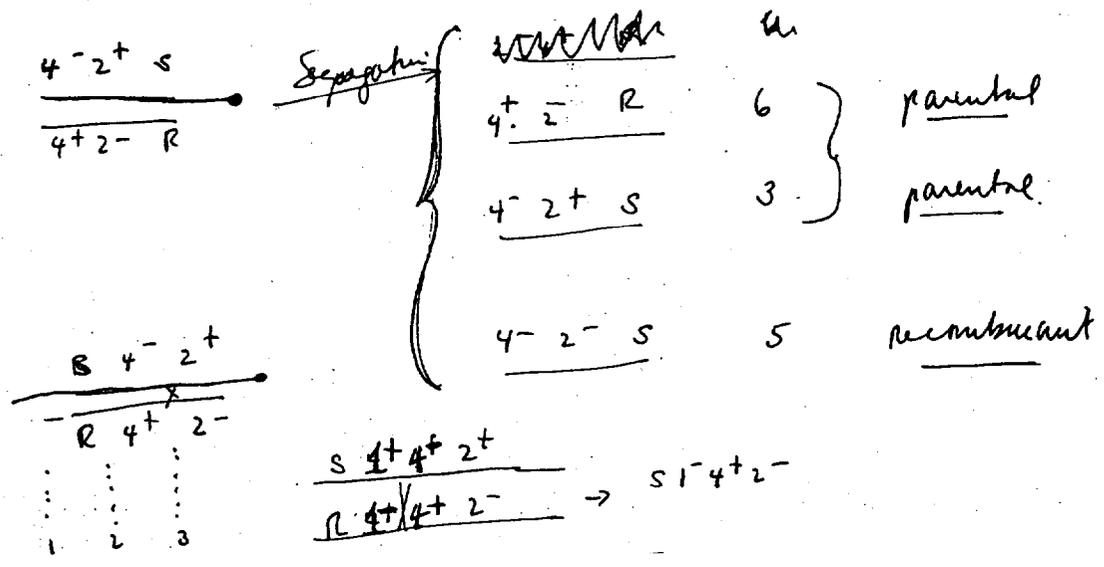
<u>Culture</u>	<u>Recipient cells</u>	<u>lytate</u>	<u>Transd. Partner</u>	<u>HFT Segregant</u>	<u>unstable det</u>	<u>NFT secondary segregant</u>	<u>Presumed structure of HFT</u>
2742	gal_2^-	gal_1^-	$\frac{2^- 1^+}{2^+ 1^-}$	2 ⁻	1 ^{1/2}	1 ⁻ 2 ⁻	$\frac{2^- 1^-}{2^+ 1^+}$
2346	gal_1^-	gal_2^-	$\frac{2^+ 1^-}{2^- 1^+}$	1 ⁻	4/5	1 ⁻ (1/2 w. stable)	$\frac{2^+ 1^-}{2^+ 1^-}$
241-14	gal_1^-	gal_2^-	$\frac{2^+ 1^-}{2^- 1^+}$	2	1 ^{1/2}	2 (1 ^{1/2} stable)	$\frac{2^- 1^+}{2^- 1^+}$
241-17	"	"	"	"	1 ^{1/2}	1 ⁻ 2 ⁻ (-)	$\frac{2^- 1^-}{2^+ 1^+}$
246A-15	gal_1^-, gal_2^-	$\left\{ \begin{matrix} gal_1^- \\ gal_2^- \end{matrix} \right\}$	$\frac{1^- 2^-}{1^+ 2^-} \rightarrow \frac{1^- 2^-}{2^- 2^+}$	2 ⁻	—	1 ⁻ 2 ⁻	$\frac{2^- 1^-}{2^- 1^+}$

Segregasi from $4^- 2^+ 4p^s$ transformed cell

SIFT NG

89

P 262



① Relationship of transduction + lysogenization.

→ diploids. h_p^+ / l_p^+ from $+/s$; s/s .

SM

Mated λ ; h_p^+ .

② Hft basis: construct $\frac{s}{s}$ i. uv'd phage. defect λ

SM

③ Position effect

SM

④ Association of fragment + chromosome. → diploids; crossing behavior

SM

SM

of various λ transduction types. Size of fragment. Behavior from $\frac{+-}{==+}$. Crossover + segregation mechanisms.

⑤ other transducible loci; other phages.

⑥ Cytology of λ , h_p^+ Hft.

⑦ bytic λ ! (Especially when grown on $\frac{s}{s}$ types!)

How?

⑧ How many λ types; mapping (sep. 12)

More 4/10/54

(91)

Table 8: Study absorption with multiplicity < 1 . Heated cells? Hft of h_2^s / h_2^r .

Table 9: Any h_1^s Clarify headings. Discuss Gal, $-xGal^-$ behavior.

Table 11 Explain Obs column

12 Total: homo/heterotype + test homogeneity.

Hft: inductive behavior! (basis now studied)

Table 18. Again verify Gal types. p.12 P2: meaning?

Double $-$. Papillae i mixed phage $\approx c^2$?

Fig 2. Or UV improves survival. Effect of excess UV'd incamp. A
Variance in output of Nft.

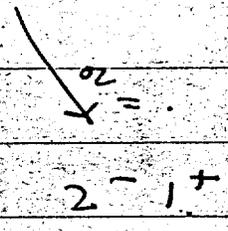
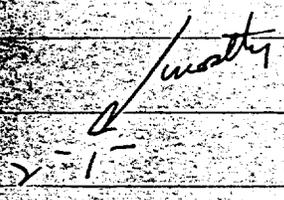
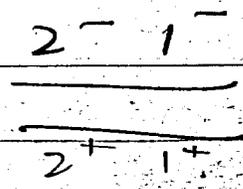
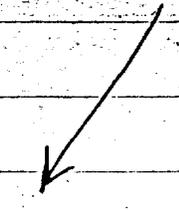
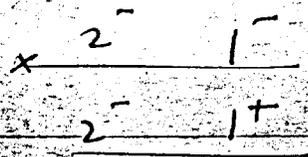
24 → x 1
12 → x 4 should fail
14 → x 2 should be OK

12. Behavior of -- x --

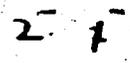
Detail?

13. ? Are discharge + segregation independent? Many "segregations" may be automatic.

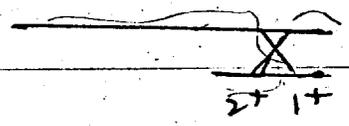
What's up with that?



are the 2^- segments now ~~para~~ hemizygous?



Suppose fragment is terminal.



Only 1 crossover type feasible! I.E. $1^- \quad 2^+$ recombinant would be

a fragment. Why no recessions of type $\frac{2^+ \quad 1^-}{2^- \quad 1^+}$? These

should give mostly the $2^+ \quad 1^-$ type. Werenough tested?

*Effect of Ultraviolet
on Gal₂ NFT A
M-218,218a*

EUGENE DIETZGEN CO.
MADE IN U. S. A.

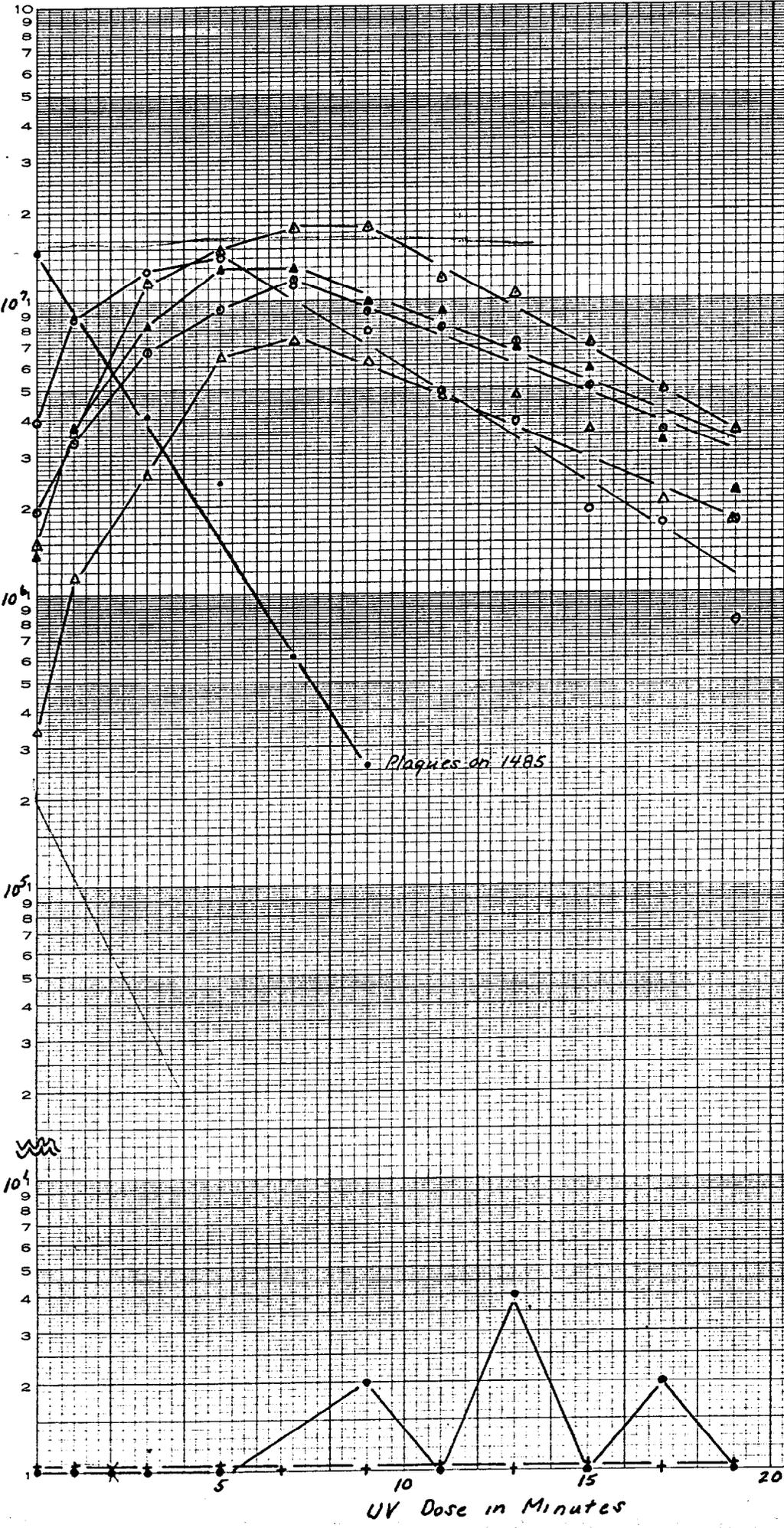
NO. 340-LS12 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
5 CYCLES X 12 DIVISIONS PER INCH

Number Per Ml. (Irradiation Tube)

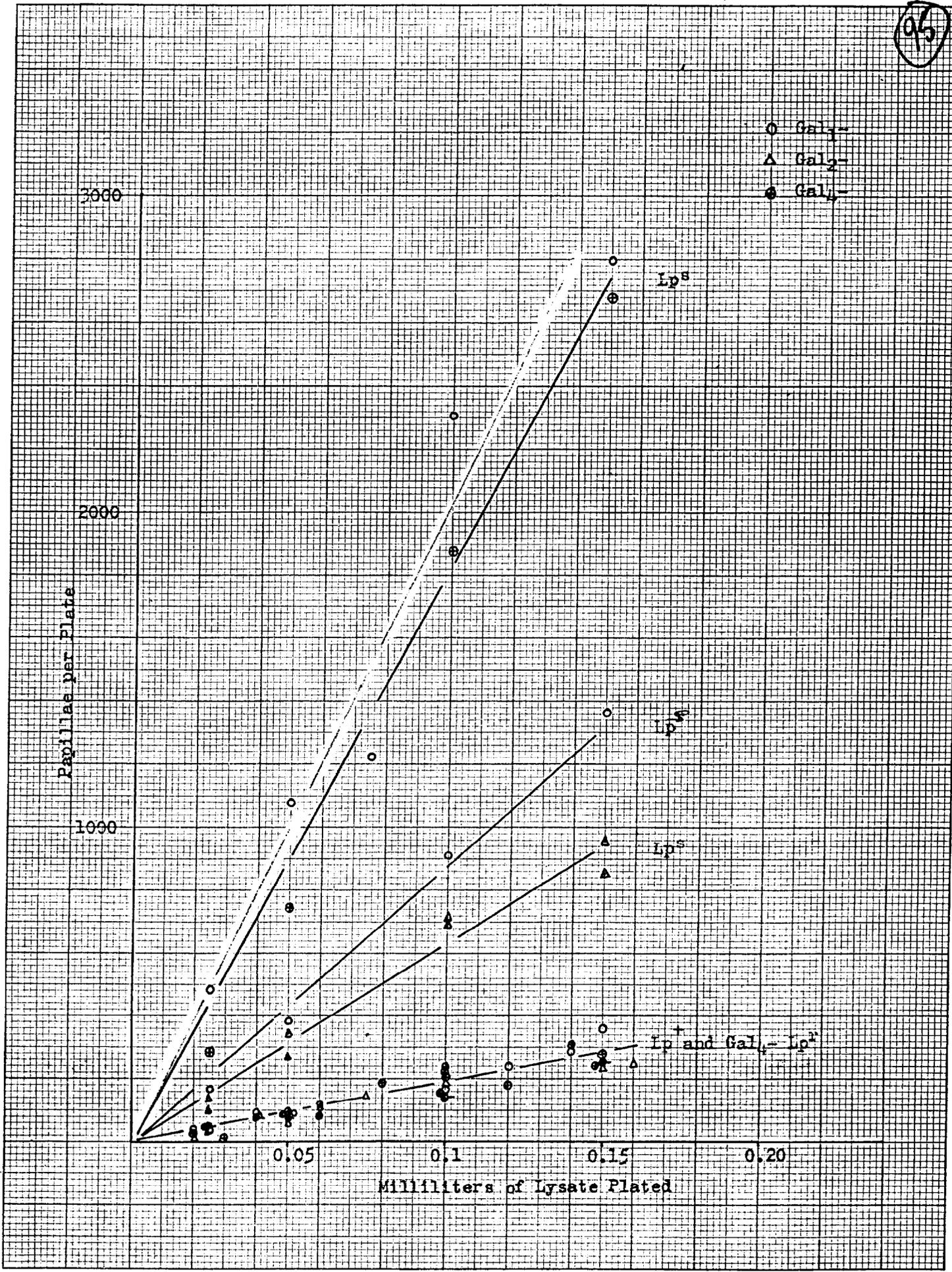
Transductions
○ 750 Gal₂ Lp⁺
◊ 2280 Gal₂ Lp⁺
△ 518 Gal₂ Lp⁺
◐ 111 Gal₂ Lp⁺
◆ 124 Gal₂ Lp⁺

Plaques on 1485

*• 2175 Gal₂ Lp⁺ (out zero)
+ 2281 Gal₂ Lp⁺ (out 15) (out 21)*



UV Dose in Minutes



Relation of k -loops
to transduction
and plaque activity
in hydatids

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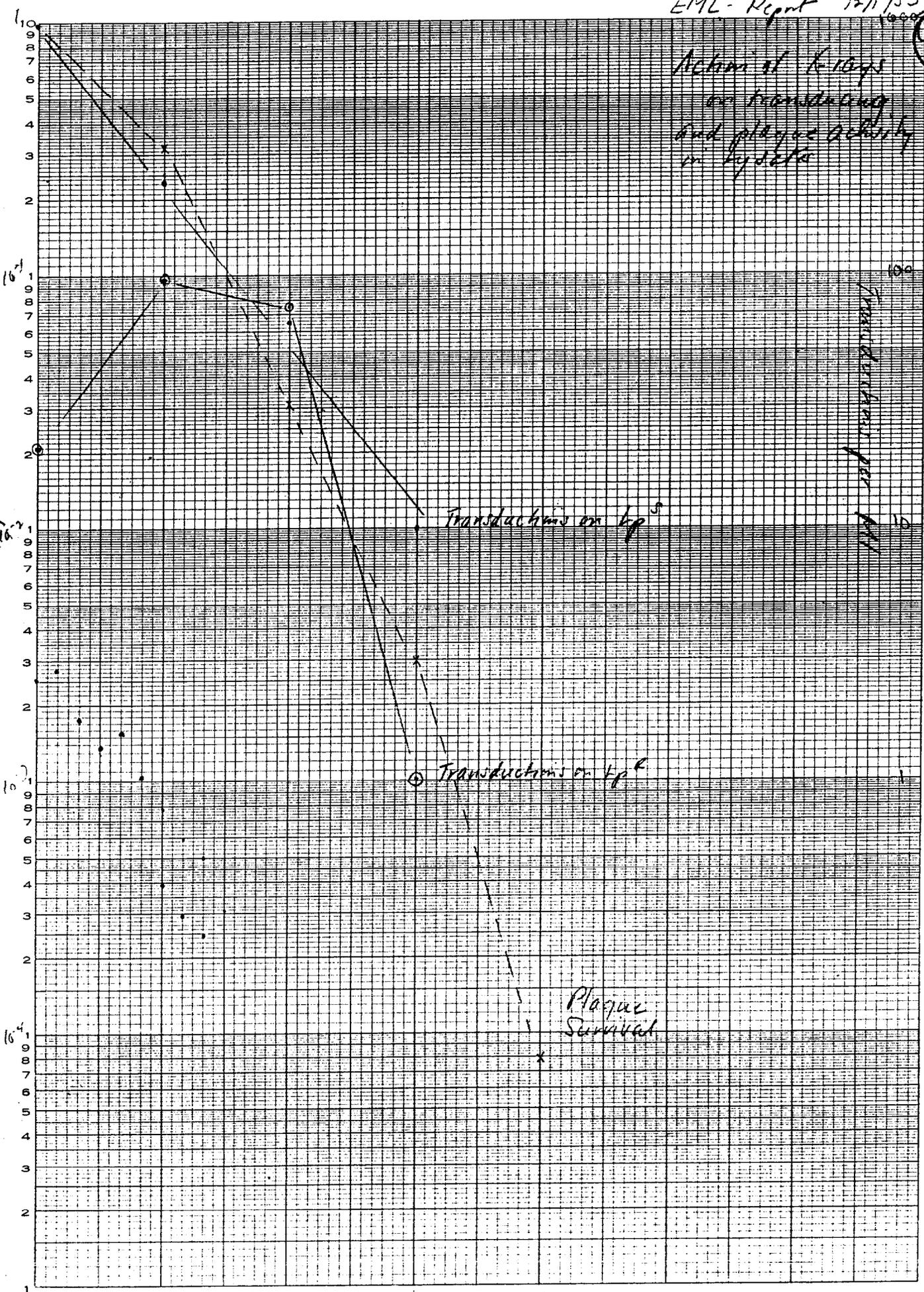
Surviving Fraction

Transductions per cell

Transductions on 10^5

Transductions on 10^6

Plaque Survival



NO. 340-LS12 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
5 CYCLES X 12 DIVISIONS PER INCH

Dose $\times 10^2$

Table 1

Wisconsin Stock Number	Principal culture genotype
W518	F ⁺ M ⁻ Lac ₁ ⁻ Gal ₁ ⁻ Lp ^S
W750	F ⁺ M ⁻ Lac ₁ ⁻ Gal ₁ ⁻ Lp ⁺
W811	F ⁺ M ⁻ Lac ₁ ⁻ Gal ₁ ⁻ Lp ⁺
W902	F ⁻ TLB ₁ ⁻ Mal ₁ ⁻ Gal ₂ ⁻ Lp ⁺
W1210	F ⁺ M ⁻ Lac ₁ ⁻ Gal ₂ ⁻ Lp ⁺
W1436 W2227	F ⁺ T ⁻ L ⁻ B ₁ ⁻ Lac ₁ ⁻ Gal ₁ ⁻ Lp ^S S ^R
W1924	F ⁺ M ⁻ Lac ₁ ⁻ Gal ₁ ⁻ Lp ^R
W2175	F ⁺ Gal ₂ ⁻ Lp ⁺
W2229	F ⁺ M ⁻ Lac ₁ ⁻ Gal ₁ ⁻ Lp ^S
W2281	F ⁺ M ⁻ Gal ₂ ⁻ Lp ^S

Genotypic symbols refer to the following characters

F⁺ or F⁻ compatibility status, F⁺;
M, T, L, B₁, nutritional requirements for methionine, tryptophan, thiamine

- Compatibility status, F⁺;
- Nutritional requirements; M, methionine; T, tryptophan; L, leucine; B₁, thiamine;
- Fermentation reaction; Lac₁⁻, lactose negative; Gal₁⁻, galactose negative; Mal₁⁻, maltose negative;
- Phage status; Lp^S, lambda sensitive; Lp⁺, lambda lysogenic; Lp^R, lambda resistant, but not readily lysogenic;
- Dmg. Resistance, S^R, streptomycin resistant.

Table 3 (EK Panam.)

Falun h. Hausdove

98

Marler

Receipt Culture Donor Pg

<u>loc</u>	W112 (L ₁ ^R)	K12	71
	" (L ₂ ^R)	"	85
	" (L ₃ ^R)	"	94
	" (L ₄ ^R)	"	94

Semi or flye	W1678	"	26
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Leuc.	W1736	"	95
	W1736	"	78
	W1476	(W1928) (W1931) W2046, W1954	113

Methowini

58-161	K12 (modulated)	82
W811	K12 (uv. mod.) (B ₁ ⁺)	83 (286) (M added also to pet B ⁺)
W1821	K12	85
W518	HFT 892 (mix)	180 (in Bgal, replica to D(0))

Lysine

W1821	K12 (uv. mod.)	83
W1821	K12	85
	W811	85
W1821	K12	130

Streptomycin

W518	W1821	95
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Proline

W2062	K12	104 (?)
W2062	K12	105
W2062	K12	106
W1692	K12	96
W1920	K12	96
W2062	(prototypic) HFT 1 (2) (prototypic) HFT 2 (M-) HFT 4 (prototypic) Heteroplasmic	220
W2062	lytic h (from M-)	227

Table 3 (Cont)

99

<u>Marker</u>	<u>Recip. Cont</u>	<u>Dunn</u>	<u>Page</u>
Mal _x -	W2071	K12(?)	119
Mal _y -	W2347, W2331	HFT 2'	298, 275
Sra -	W 2307	HFT 2'	298
F+	1321	HFT 2	274

Frequency of Unstable Transduction - lysates

(100)

Phage Cues	(+)	1 ⁻	2 ⁻	4 ⁻
1 ⁻ L _p ^s	9/22 15/24 (41)	-	0/11 0	0/29 (0)
L _p ⁺ (1)	23/24 (96)	-	23/24 (96)	0/27 (0)
L _p ⁺ (2)	17/24 (71)	-	24/24 (100)	-
<hr/>				
2 ⁻ L _p ^s (2281)	20/48 (58)	63/78 (88)	-	64/78 (89)
L _p ⁺ (1) (2.75)	22/24 (92)	19/24 (79)	-	14/24 (67)
L _p ⁺ (2) (12.0)	16/24 (67)	21/24 (88)	-	22/24 (92)
<hr/>				
4 ⁻ L _p ^s	13/24 (54)	0/72 (0)	21/24 (88)	-
L _p ⁺	20/24 (83)	0/96 (0)	19/24 (79)	-
L _p ^R	29/48 (60)		18/24 (67)	-

Calc 6 L_p^s 6/8
Calc = 1210, 2281
above

10
S = 56/102 (47/50) = 59%
+ = 98/120 = 81%
n = 29/48 = 60%

Table
Total

4844
609 total

0.7
67 | 484.0
63